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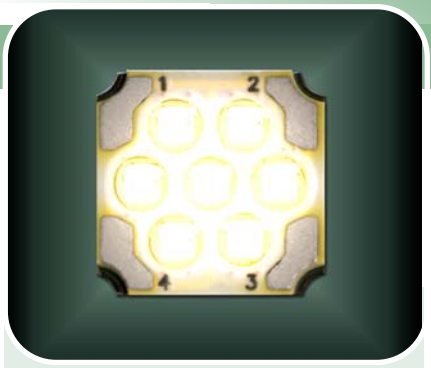
Bright Lights. Bright Ideas. ™

Brilliant Light!

BL-2000SERIES

White 4300K LED Light Engine



Lamina Light Engines

As the market leader in the development and manufacture of super-bright LED arrays, Lamina brings solid state lighting to applications which until now were only possible with traditional lighting sources.

Lamina's LED arrays are manufactured by combining high brightness LEDs from industry-leading LED manufacturers with Lamina's proprietary packaging technology, multilayer Low Temperature Co-Fired Ceramic on Metal (LTCC-M). LTCC-M is a breakthrough in thermal performance for LED packaging technology, a key factor in determining LED life and reliability. Unmatched thermal performance coupled with package interconnectivity allows Lamina to densely cluster multiple LEDs to achieve exceptionally high luminous intensity in very small footprints. Lamina's arrays are available in white, RGB and monochrome, from 1W to 100W, and also are available in custom packages.

- High Luminous Flux in Small Footprint
- Superior Thermal Performance for Improved Reliability
- Long Life and High Lumen Maintenance
- No Mercury or Lead
- Custom Sizes and Shapes Available

BL-2000 White

Lamina BL-2000 white LED arrays are configured with seven cavities, each populated with multiple LEDs. Multiple LED die in each cavity, a unique feature made possible with Lamina's packaging techology, assure Lamina light engines deliver optimal color uniformity.

Lamina's white 4300K LED light engines are designed with an enhanced spectral distribution rich in red for applications demanding improved color rendition (90 typcial CRI) and warmer color temperatures.

Typical Applications

General Illumination

Task Lighting
- Table Lamps
- Flashlights

Signage & Channel Letters

Architectural Lighting
- Decorative and Mini-accent
- Cove and Under-shelf
- Garden and Pathway
- Step Lights

Automotive
- Interior

LCD Backlight
- Computer Displays
- Heads Up Displays

Signals
- Airfield Taxiway
- Traffic
- Security
- Beacons
- Rail

To see how you can realize all these design benefits, to request a sample, or to speak with an engineer about your design, contact Lamina at 800.808.5822 or 609.265.1401 or visit www.laminaceramics.com.

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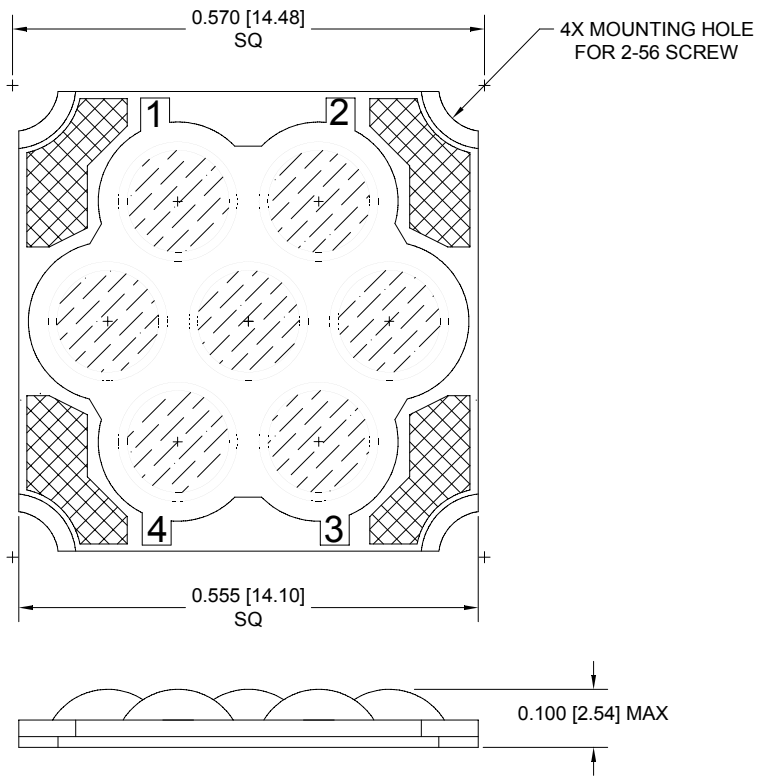
Technical Data

Part # BL-22D1-0244	Symbol	Min	Typical	Max	Unit
Color Temperature **	CCT	3500	4300	5500	°K
Voltage*	V_F	-	24	-	V
Test Current	I_F	-	0.21	-	A
Power*	P	-	5	-	W
Luminous Flux*	Φ_V	91	100	-	lm
Thermal Resistance	T_R	-	2.63	3.5	°C/W

*Note 1. Optical and Electrical specifications are given for the specified drive current at a 25°C junction temperature.

**Note 2. Typical CRI is 90.

Mechanical Specifications



Attachment Recommendations

Lamina's BL-2000 Series is configured with solder pads compatible with Sn63 or Sn62 solder. As with many electrical devices, non-acid RMA type solder flux should be used to prepare the solder pads before application of solder. If wire attachment is performed with a soldering iron, care must be taken to minimize heat transfer to the die and minimize leaching of the solderable pads.

Assembly Recommendations

Lamina BL-2000 LED arrays are designed for attachment to heatsinks with conductive epoxy or screw down for flange mount devices with thermal grease in the joint. In limited cases, thermal transfer tape can be used, but will generally result in higher than desired thermal resistance creating excessive heat and reducing light output and die life.

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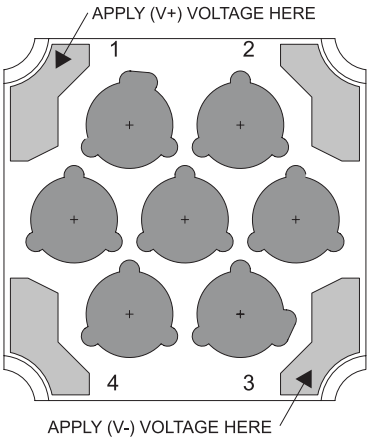
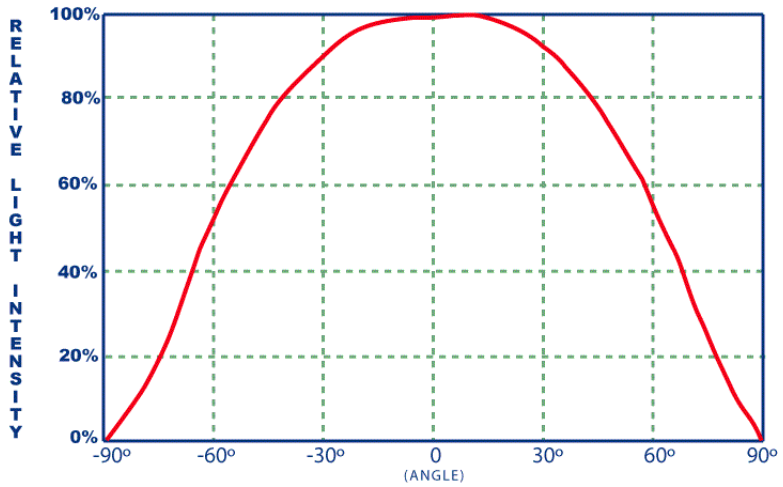
Electrical Connections



Typical Beam Pattern



Heat Sink Recommendations

Lamina LED arrays provide efficient transfer of heat from the individual LED die to a customer supplied heat sink. All Lamina LED arrays must be operated at or below 125°C. A heat sink must be attached to the array with sufficient cooling capacity to keep the die junction below 25°C. The temperature rise from the array base to the die junction may be determined by calculating the product of the maximum package thermal resistance and the desired operating power level.

Junction Temperature Rise (Tj (rise)) = Operating Power (P) x Lamina Array Thermal Resistance (Tr)

The appropriate heat sink may then be determined by:

Heat Sink Thermal Resistance (°C/W) = (125 - Tj (rise) - Maximum Ambient Temperature)/P

Optical Recommendations

Lamina LED arrays project a Lambertian radiation pattern, with projection angles built into the package cavity at approximately 125°. It will be necessary for users to create an optical reflector and lens structure that meets their light dispersion requirements. Please contact Lamina Application Engineering for support with your optical needs.

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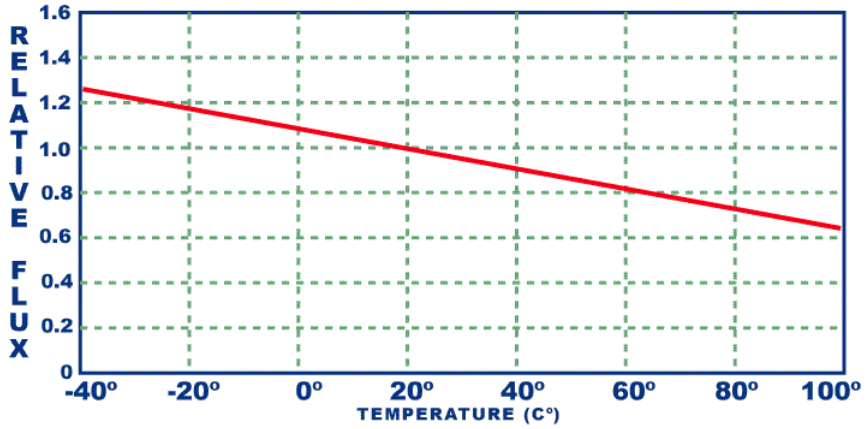
Luminous Flux with Junction Temperature



Light Output vs. Junction Temperature

Light output from LED die will decrease with increasing junction temperature. This effect is particularly acute for die in the 580 to 750 nm range. As a result we recommend that the LED array heat sink design be optimized to maintain the die junction temperature as low as possible.

ESD Protection

LEDs are static sensitive and susceptible to Electrostatic Discharge (ESD) damage. Lamina LED arrays must be handled using ESD damage control precautions.

Handling Precaution

Contact with the silicone based encapsulant on the surface of the light engine must be avoided to prevent damage. Do not apply pressure to the silicone based encapsulant or allow it to come into contact with sharp objects. Lamina LED arrays must be handled from the sides.

Lamina Ceramics
120 Hancock Lane
Westampton, NJ 08060

Specifications subject to change without notice.

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